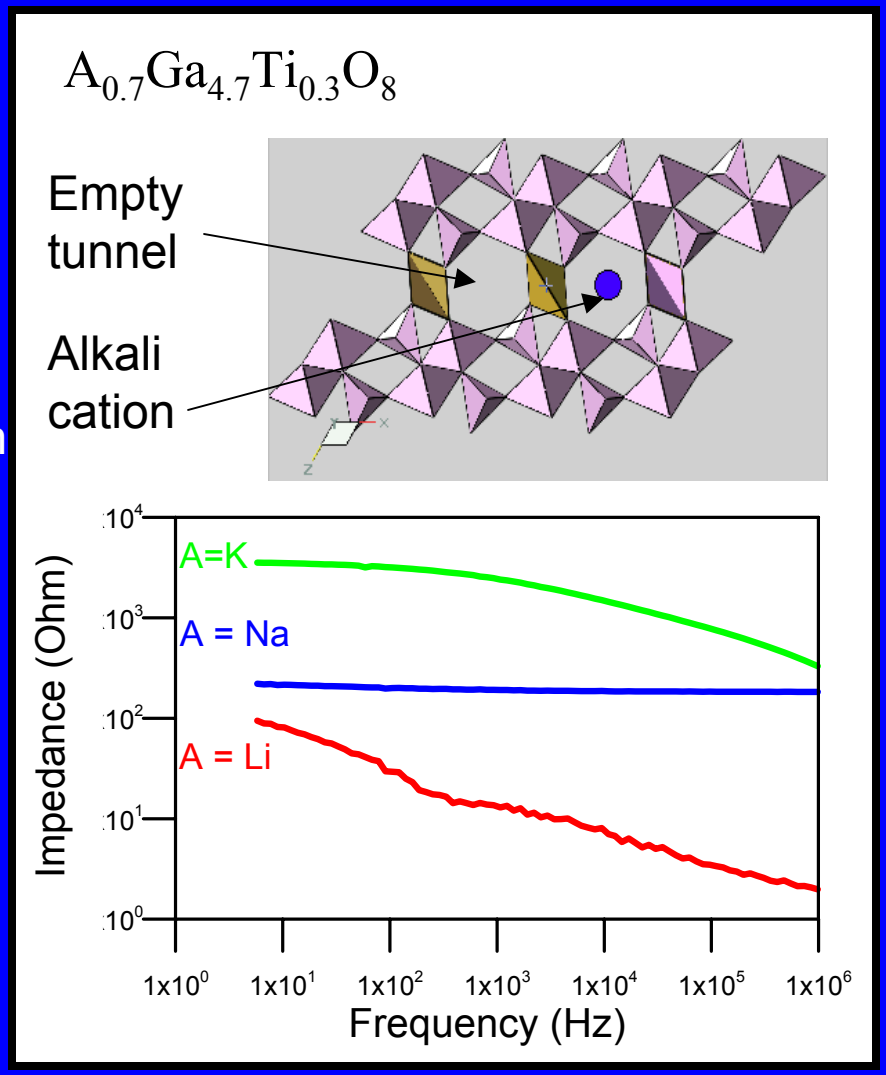
Ion Transport in Beta-Gallia Rutile Intergrowths

Doreen Edwards, Alfred University, DMR-0093690

Materials with guest-host architectures are used in electrochemical devices, such as batteries and fuel cells, to store and transport cations. This work is investigating the factors which influence phase stability and the relationship between crystal structure and transport properties in a family of materials known as beta-gallia-rutile (BGR) intergrowths. The BGR intergrowths possess 1-D tunnels which serve as pathways for mobile cations. Ion exchange techniques are being used to prepare materials that cannot be prepared using solid state reaction. Impedance spectroscopy has shown that the transport properties depend on the size of the mobile cation.



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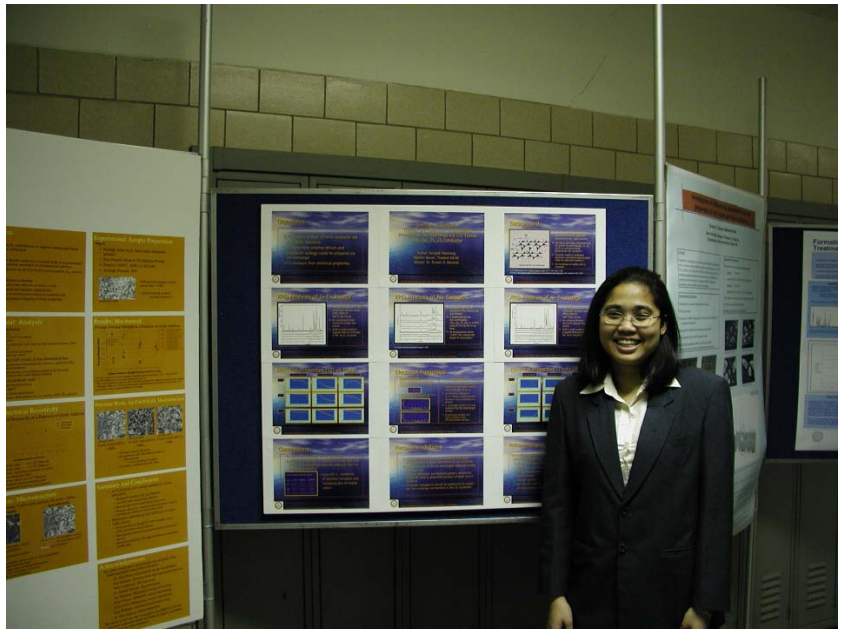
Education and Outreach: Three graduate students (Andrea Jaromin, Nathan Empie, and Malin Charoenwongsa) and one undergraduate student (Nonglak Meethong) contributed to this work. Jaromin presented a poster titled “Synthesis and Characterization of Mn-containing BGR Intergrowths” at the annual meeting of the American Ceramic Society (ACerS) and defended her M.S. thesis titled “Phase Stability of Beta Gallia Rutile Intergrowths” in May 2003. Empie presented a talk titled “Phase Stability of Alkali Doped BGR Intergrowths” and won second place in the scanning probe category of the ceramographic contest at the annual ACerS meeting for his poster titled “Defects in Gallia-doped Rutile”.



Nonglak Meethong presented her senior thesis research on ion exchange at Alfred University’s senior thesis poster session.